

# Role of university museums and collections in disseminating scientific culture

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## Resumo

Partindo da definição de museus científicos como os contextos materiais onde os artefactos científicos e tecnológicos são preservados e onde a cultura científica é elaborada e disseminada, discutem-se então os diferentes meios de que dispõem os museus de história da ciência e os museus de ciência para cumprir a sua missão. Devido à sua origem, os museus universitários possuem pontos em comum com estes dois tipos de museus e também têm um papel a desempenhar, quer na investigação quer na inovação em museologia e em museografia das ciências. Sobretudo, constituem locais onde a cultura científica é disseminada.

## Abstract

Starting from the definition of scientific museums as the material context where scientific and technological artefacts are preserved and scientific culture is elaborated and disseminated, the different ways in which museums of history of science and science museums accomplish their task will be addressed. University museums, due to their origins, have features in common with both types of museums. They can play a role in research and promoting innovation in scientific museology and museography but above all as places where scientific culture is disseminated.

## Foreword

Philosophy which inspired the setting up of big institutions for conservation and arrangement of artistic and historical heritage (paintings, statues, bass-relieves, frescos, archaeological objects, scientific instruments, books, machines, manuscripts, botanical gardens, etc.) has changed very little since French Revolution. Historical

heritage was disassembled: books in the libraries, manuscripts in the archives, objects, according to their characteristics, in the Museums. Very often these institutions were, and are again, hosted in buildings important from historical and architectonic point of view.

In art museums, in particular, communication between displayed material and public was very poor:

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little and unreadable captions were, often, the only bridge between museum and its public. Visitors have to feel the 'beauty' of the object, nothing else being needed for its understanding. Of course the museum language is complex and written messages represent only one aspect of it: 'evocation' and 'emotion' play an important role in museum communication. But these feelings were stimulated in art museums by the single object: rarely they were conveyed by the arrangement of the displayed material.

As matter of fact, the most important innovations in our century dealing with museology and museography have taken place in scientific museums.

When I speak of scientific museums I refer to four kinds of institutions: a) collections at scientific research institutes assembled for conservation and displaying; b) History of Science Museums; c) Science Museums; and d) Science Centres. Steven de Clercq has proposed a different classification, but it is uninfluent in respect of the problems I want to deal with.

We can speak about scientific museums of third generation starting from the beginning of the 20<sup>th</sup> century. In the 20<sup>th</sup> century the main innovation was the possibility for visitors to interact with the displayed objects. In the Deutsches Museum (Munich) the 'push-the-button' technique was introduced: in a diorama, the visitor, pushing a button, observes an automatic execution of an experiment or can follow the phases of manufacturing in an industrial plant. The Museum was planned in reaction to the Renaissance Cabinet of curiosities and in reaction to museums, heirs of the great International Exhibitions, which had the aim of demonstrating the beneficial influence of science and technology on the progress of society. The designers of the Deutsches Museum wished to give to scientific artefacts the same cultural

dignity of artistic artefacts. In order to achieve this goal people had to be educated to science and technology. A big didactic effort of communication of the meaning of the displayed objects was made and new techniques of displaying were planned.

The diorama was a great invention for museums: it allows to stress the importance of the context against the 'beauty' or the 'rarity' of a single object. The fetishism of the object is replaced by its meaning inside a reconstructed environment. Later on, diorama techniques have been largely used in natural history museums and have replaced show-cases full of stuffed birds or of minerals. (This is not completely true for dinosaurs, where the display of single animals is very common, maybe due to their unexpected 'telegenic' success on the media).

After the second world war, new 'hands-on' institutions were established – Exploratorium (San Francisco), La Villette (Paris) – where visitors can touch the objects and interact with them in order to carry out some easy scientific experiments or to perceive the main characteristics of some natural phenomena. These institutions have not the aim of safeguarding historical objects but to teach science while stimulating the visitor's participation in doing something.

The idea of 'learning-by-doing' was inspired by a pedagogical attitude for making science more appealing, after the war disasters in which scientists had played an important role: in this way, some science communicators hoped to overcome a diffuse distrust in science, particularly alarming in young people. Moreover some intellectuals and scholars, above all scientists, thought that the history of science, and consequently, museums of history of science or the historical sections in science museums were useless in communicating science and scientific

culture. According to their view, science was progressive and cumulative: last scientific theories replaced old ones whose valid parts are included in the new theories. Why ought we keep in museums what has been superseded? Museums of history of science were considered little more than warehouse of old and useless objects. But in this way, science is presented unrealistically, as a one-way success-story with little attention for the often interdisciplinary and open-ended scientific process of trial and error (DE CLERCQ 1997). And loss of historical perspective in scientific communication could be the source of gaps between scientific and humanistic culture.

Some years ago scientists, historians of science and intellectuals debated about domination of humanistic over scientific culture. Nowadays the situation is completely different. Science and above all technology are more and more pervasive in everyday life of billions of people. The problem is that rational awareness of their presence is very little diffused and humanistic culture is unable or, maybe, not interested, to face the new situation.

In order to improve the communication with its public and to increase the amount of visitors science museums have introduced 'hands-on' techniques. Beautiful collections of historical instruments have been sent to cellars where they are destined for destruction and dispersion: in my opinion the only tangible result has a loss of identity without a considerable improving of a museum communication. This was foreseeable: languages cannot be mixed artificially in order to compose a sort of a museum Esperanto.

## Context and Museums

In this context university museums can play an important role of experimenting new ways of

conservation and exhibition of the historical heritage and dissemination of scientific culture. Universities have for centuries created new scientific and technological knowledge and a great deal of material is stored in them: instruments and apparatuses, laboratory diaries, libraries of books and preprints and so on. All this material, and know how encapsulated in it, becomes rapidly obsolete for scientific researches: when it is no longer usable scientists consider it a obstacle for new researches. Sometimes experimental apparatuses are dismantled and some pieces are inserted in other apparatuses. In some cases material no longer used for research is sent to museums, national libraries and to state archives. But in this last decades some universities, continuing a long tradition lasting from four centuries, have decided to conserve their historical material, select modern material no longer used and have used the museum environment for initiatives of dissemination of scientific culture.

University collections have an important characteristic from a museological point of view. We know that the value of historical heritage doesn't consist in the 'beauty' or 'rarity' of the single object but in the fact that it indicates a research track. The instrument or the experimental apparatus was inserted by some scientist in a research path which allowed him to acquire knowledge about some natural phenomena. If we stress the importance of the single object we transform it in relics to be adored. Moreover, if we use the criterion of beauty there is the risk of large part of the historical heritage of late 20<sup>th</sup> century science of being scrapped as Paolo Brenni has stressed in an article on the magazine of the European Physics Society (BRENNI 2000).

I have pointed out that after the Second World War scientific museology has been oriented towards the

division between conservation on one hand and science education and teaching activities on the other hand, relegating the former to science museums and history of science museums and the latter to Science Centres. But I'm not sure that this division has improved dissemination of scientific culture. We should ask if 'hands-on' techniques, without an historical perspective induced from exhibition of historical apparatuses and instruments, are able to disseminate scientific culture.

For scientific culture I mean a set of shared values about the nature of science and technology, about their methods for acquiring knowledge, about the differences between scientific truth and other kind of truths, if any. Scientific culture is a result of a good scientific training in schools or universities. But it is also the result of stimulations coming from the society around us: we acquire a spontaneous culture from relationships with other people, from the media, from publicity and so on. Evocation, allusiveness, metaphor, imitation are the main features of the transmission of the diffused culture inside the society. On the basis of these stimulations people build their ideas about science and form models for interpreting natural phenomena. Therefore, scientific culture depends not only on the amount of specific technical and scientific knowledge acquired in the schools or in the universities, but depends also on values which are rooted in society's diffused culture and are unconsciously assimilated.

Science museums and history of science museums are important devices for transmission of the diffused culture and in their history they have performed this task. They have just the characteristics which define the way in which the culture is diffused in society: evocation, allusiveness, metaphor, emotion.

Now, we have to understand if university museums can be useful in reinforcing the main features of science and history of science Museums. My answer is affirmative and I'll try to present the corresponding arguments.

University people who are interested in the preservation and conservation of historical heritage very often think that their activity is a spontaneous and not requested service that they offer to their university in order to improve the external image of the university. And they ask attention for their activity because it creates social consensus about the university institutional tasks. However, it is an illusion to think that this spontaneous activity is enough in order to influence universities in providing space, money and human resources to these activities. It seems to me that we need to be aware that the mission of universities is to carry out innovative scientific research and we have to be able to insert our museums' activities in this mission and context. On the ground of acquired experiences is possible to show that two types of research can be developed in university museums: a) research on historical heritage; b) research about new ways of exhibiting and communicating this historical heritage to the public at large.

#### Historical research

The aim of historical research is to reconstruct a past context on the ground of the preserved documentation (instruments included), selected and analysed according to criteria greatly influenced from the diffused culture in the society. In universities, this type of research takes advantage of the fact that the single object (letter, instrument, etc.) can be inserted in a meaningful context, because we can easily find tracks of it in the university museum, in the library,

in the archives, and so on. In the usual (non university) museum the link between the single object and the context in which it was used is complicated or even impossible to reconstruct: a cultural disaster for historical memory.

An important result of historical research is the publication of instruments, books, archives inventories and catalogues. These devices, as well as others such as papers or books about specific objects or collections, are important for the planner of the museum arrangement because she or he knows that she or he needs a deep knowledge of what is to be communicated to visitors.

#### Communication research

Moreover, it's possible to carry out scientific research also on new ways of exhibiting and communicating historical heritage. At the beginning of this talk I have said that interactive communication between displayed objects and visitors has been the main feature of 20<sup>th</sup> century museology and that scientific museums have been protagonists in this field. However, interaction is a business between visitors and one object at once: arrangement of the objects does not influence visitors' experience. But this way some important aspects of the museums communication are neglected. When a visitor observes a big steam engine in a museum he or she often associates with it the idea of industrial revolution. This happens because he has a scientific culture – although spontaneous, he or she has a representation of the behaviour of the natural phenomena and expectations on what science and technique can provide him or her. Thus, communication of the historical heritage must be continuously reconsidered by museums operators in relation to the changeable representations of science

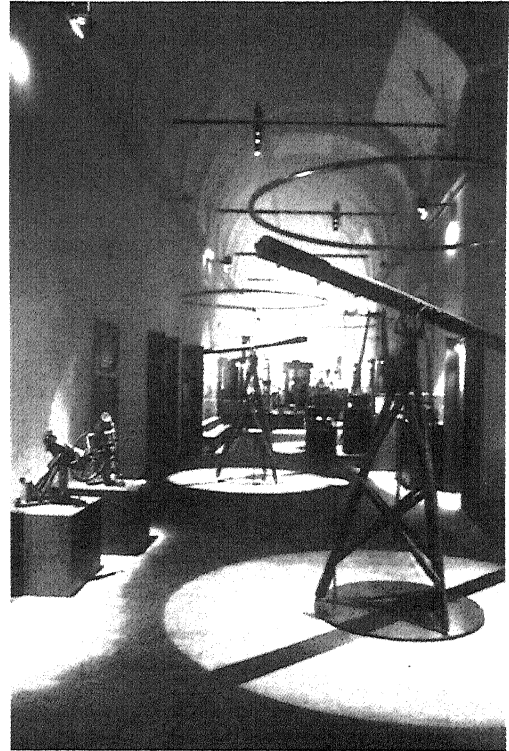


Fig. 1 - Brera Astronomical Museum. Arranged by the Istituto di Fisica Generale Applicata of the University of Milan with instruments from the Brera Astronomical Observatory (Photo courtesy of Istituto di Fisica Generale Applicata, Sezione di Storia della Fisica).

and technique. These representations are determined not only by specific knowledge acquired in the school and in the university but also through the diffused culture in the society: it's this last one that determines people beliefs, suggestions, and ethical values about science and technique.

A better understanding on the way in which scientific spontaneous representations are formed can be achieved only through rigorous research programme. And the university environment is particularly suitable for this task. The results of this

research can be useful to museums operators, both in universities and outside, but also everyone involved in initiatives of scientific culture diffusion: scientific magazines and articles, video-documentaries and so on.

To conclude, university museums are a cultural wealth that must be safeguarded, studied and

exhibited. And university museums operators must do a big effort to open their museums to scholars and to public at large. If museums operators realise that public at large, instead of being an obstacle to their activity, represent an opportunity for studying the way in which scientific and technological culture spreads throughout society, then they can find a role that legitimates their activities within universities.

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